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ABSTRACT

It has been suggested than an educational curriculum should include training in working with people as well as with ideas. Measuring and conceptualizing "social intelligence has been difficult, however. Although the idea of social intelligence has a long history, most tests which have been proposed to measure such ability correlate highly with tests of verbal aptitude. The present study describes six factors of "behavioral cognition" or social intelligence suggested by Guilford's Structure of Intellect model. These social intelligence factors are defined by 23 tests using photographs, cartoons and other drawn materials, and tape-recorded sounds. The six behavioral-cognition factors are shown to be distinct from factors defined by 24 tests of verbal aptitude, spatial ability, and creative thinking. The 18 reference and experimental factors hypothesized and demonstrated are described and discussed. To date no similar factors, reflecting the abilities involved in understanding the feelings and intentions of others, have been reported. Supplementary materials including sample items, scoring formulas, number of parts per test, working time allowed, the correlation matrix, rotated and unrotated factor matrices and target matrix are appended. (Author/RC)

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Six Factors of Behavioral Cognition: Understanding Other People

MAUREEN O'SULLIVAN and J. P. GUILFORD

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SIX FACTORS OF BEHAVIORAL COGNITION: UNDERSTANDING OTHER PEOPLE

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In her recent presidential address to the American Association for Higher Education, K. Patricia Cross (1974) pointed out that present models of education overemphasize the narrow band of human abilities that enable people to perform academic tasks. She suggested a three-dimensional model that prepares people to work with data, work with things, and work with people. In Cross' view the task of education is to develop the student's ability to the point of excellence in one area and to "prepare him or her to live in today's world by developing at least minimum competence in the other two areas " (p.4). If these suggestions are to be implemented by educators, they require means of conceptualizing and measuring the abilities involved in each of these three areas so that appropriate curricula may be developed.

More than fifty years ago, E. L. Thorndike (1920) suggested that human intelligence is composed of three aspects: abstract, mechanical, and social intelligence (paralleling the work skills outlined by Cross). Although both abstract and mechanical intelligence have been successfully measured, early attempts to develop independent measures of social intelligence had not been successful. Both R. L. Thorndike (1936) and Woodrow (1939) found that tests designed to measure social intelligence were loaded on factors defined by verbal-ability tests. The present study is one contribution to the conceptualization and measurement of some of the abilities involved in the task of

working with people.

In our view, Thorndike's "social intelligence" and Cross's "work with people" are too general to be of practical value over and above naming the domain of interest. Observing people interacting with other people suggests that there are a number of different ways of being socially intelligent. As Argyle (1972) has noted, "Clearly most people are better at some social tasks than others.... There are, for example, people who are better at handling audiences, or committees, than at dealing with individuals -- or vice versa" (p.77). Some people are astute in understanding or cognizing what others think and feel, but for reasons of timidity or poor social training do not behave well in social situations. Others, while not particularly perceptive of others' feelings and thoughts, are socially poised and well-informed. Some individuals, such as successful statesmen, can produce many different solutions to a social problem.

One of the few theories of human intelligence that includes social intelligence abilities is Guilford's (1967) Structure of Intellect (SI) model. The Structure of Intellect postulates 120 different factors of intellectual ability organized along three dimensions: content (semantic, symbolic, figural, and behavioral); operation (cognition, memory, divergent production, convergent production, and evaluation); and product (units, classes, relations, systems, transformations, and implications). Within the behavioral content area, Guilford hypothesizes 30 different intellectual abilities categorized according to the five intellectual operations and six products involved. For example, persons with the ability to think of many different social solutions or to generate many different facial expressions might be described as gifted in the area of behavioral divergent production (Hendricks, Guilford, & Hoepfner, 1969). Individuals skilled in making the correct social response demon-

strate behavioral convergent production. Those who make wise social decisions are good behavioral evaluators, while those who never forget an interpersonally relevant occurence have superior behavioral memory.

This study demonstrates the existence of six factors of social intelligence dealing with the ability to understand other people's thoughts, feelings, and intentions. These are called factors of "behavioral cognition" to indicate that they refer only to the abilities to cognize or understand behavior and not to other abilities which might more broadly and inclusively be termed "social intelligence."

PROCEDURES

Test Construction

We assumed that expressive behaviors such as facial expressions, vocal inflections, postures, and gestures are the cues from which intentional and emotional states are inferred. Therefore, behavioral cognition, as measured in this study, is more fully defined as the ability to understand the thoughts, feelings, and intentions of other people insofar as they are manifested in discernible behavior.

Although behavioral cognition is probably most adequately demonstrated in real-life situations, economy dictated tests which used less than life-size stimuli. In the present study, the stimuli used included photographs of human faces and bodies, cartoons, and tape-recorded words and sounds. Motion picture tests were not used because of expense, as well as our belief they would prove to be factorially complex. Verbal stimuli were avoided as much as possible since it seemed to us that the use of such stimuli was one of the major causes of failure in the early attempts to measure social intelligence as a separate ability. If situations are verbally defined, semantic abilities provide the dominant variance in solving the task. The various kinds of

stimuli used were distributed evenly among the tests hypothesized to measure each of the six factors. In this way, no single behavioral factor could be defined by only one kind of stimuli. For example, tests designed to measure the ability to cognize behavioral units included photographs of faces, drawings of gestures, postures and faces, verbal statements, and tape-recorded sounds. Cognition of behavioral-relations tests did not use sounds but did use all the stimuli types included in the units tests, and, in addition, used cartoons, silhouettes and stick figures. Figure 1 illustrates the variety of stimuli and test formats used.

Insert Figure 1 About Here

Behavioral Cognition Factors and Tests[1]

Cognition of behavioral units - CBU.

The factor, CBU, refers to the ability to understand behavioral units. In the area of verbal intelligence, a unit is defined as a word or a meaningful concept. In the behavioral area, the unit is defined as an expression that communicates feeling, intention, or attitude. Such units include facial expressions, vocal inflections, hand gestures, and body postures. Although some investigators have studied human communicative behavior using facial-muscle changes as units (i.e., forehead wrinkles, narrowed eyes), such muscle changes do not occur in isolation. Usually, the communicative unit in understanding others is the whole facial expression, not part of one. Four CBU tests were constructed. Like most of the behavioral-cognition tests, each consisted of two parts, with 15 items per part. All tests were timed, but the time limits were generous and most subjects were able to complete the tests in the time allowed.

Expressions - Choose the one of four alternative drawings of either a facial expression, a hand gesture, or a body posture that has the same behavioral meaning as a given drawing. The drawings developed for this test were suggested in part by Krout's (1935) list of expressive gestures.

Faces - Choose the one of four photographed male-facial expressions that has the same meaning as the given female-facial expression. The male faces were selected from the Frois-Wittmann photographs published by Hulin and Katz (1935). The female photographs are of Marjorie Lightfoot, from the series developed by Engen, Levy, and Schlosberg (1957;1958).

Inflections - Choose the one of four drawn facial expressions that matches the voice inflection in a tape-recorded phrase such as "I did it" or "No".

Questions II - Choose the one of four alternative verbal statements that goes with a photographed facial expression of the French actor, Fernandel (Halsman, 1949).

Cognition of behavioral classes - CBC.

A class is a group or aggregate whose members possess a common attribute which can be abstracted. The ability to understand classes, to cognize the class idea, is related to concept formation, generalization, and abstraction. In the behavioral area, CBC refers to the ability to generalize from behavioral information, to see the similarity in a group of intentional or emotional expressions. The four classes tests used three different test formats: grouping, exclusion, and naming.

Expression Grouping - Choose the one of four expressions that belongs with a given three-expression group. The stimuli used in this test are similar to those in the CBU test, Expressions.

Picture Exclusion - Choose the one of four photographs of hand gestures,

facial expressions, or body postures that does not belong.

Odd Strip Out - Each item consists of three four-panel Ferd'nand cartoon strips (Mik, 1960; 1961; 1962; 1963; 1964). The task is to indicate the cartoon sequence in which Ferd'nand acts differently than he does in the other two.

Sound Meaning - Choose the one of four words such as "tired" or "fearful" that describes a group of three tape-recorded sounds, such as heavy breathing, a startled laugh, and a whimper.

Cognition of behavioral relations - CBR.

Relationships in the other content areas of the SI model refer to meaningful connections between units. One way of illustrating a relationship is by means of an analogy. For example, in the semantic-content area, in the analogy, dog is to puppy as adult is to child, the semantic units (concepts) of dog and puppy, adult and child, are related in terms of age, with the first concept of each pair being the older. Another type of relationship, often included in analogies, is that of opposition. "Up" and "down" are related concepts since they are opposite in meaning. In defining the factor, CBR, we felt that the ability to understand behavioral relations included two components. One was the ability to understand the relationships between units present in analogy and opposites formats. Two of the four CBR tests are based on this definition. The second definition of this factor refers to the social relationships between individuals. We felt that differences in cognizing behavioral relations might be revealed in differences in understanding the relationships between two persons. Two of the CBR tests are based on this definition.

Cartoon Analogies - Choose the one of three alternative expressions that is related to a third given expression in the same way that a second

given expression is related to the first.

Stick Figure Opposites - Choose the one of three stick figures that expresses a feeling opposite to that of a given stick figure. The stick figures used in this test were suggested by those developed by Sarbin and Hardyck (1955).

Social Relations - Choose the one of three verbal statements that fits the relationship between two schematically-drawn faces. The schematic faces in Social Relations were adapted from those used by Cline (1956).

Silhouette Relations - Choose the one of three facial photographs that expresses the same state of mind as a specified member of a pair of head-and-shoulders silhouette figures facing one another. The tilts and levels of the silhouettes relative to one another define the relationship between them. The silhouettes were suggested by work done with similar materials by Knapp (1963).

Cognition of behavioral systems - CBS.

The systems product in the SI model refers to organized, complex, interrelated information. In this study, behavioral systems were conceptualized in two ways. The first was as sequences of social behavior in which the feelings and intentions of individuals involved with one another are of paramount importance. Two tests, Missing Cartoons and Missing Pictures, were based on the notion of behavioral systems as sequences of behavior occurring over time. The temporal element, however, need not be the crucial one. A behavioral system might exist in which the systems variance is contributed by the complexity of the interrelatedness of three or more characters, or by two characters interacting with their environment. For example, an appreciative man and a skeptical woman reacting to a third stimulus, a beauty contest, is a behavioral system in this second definition of CBS. One test,

Facial Situations, was constructed for this second aspect of the factor.

Missing Cartoons - Choose the one of four alternative Ferd'nand cartoons that completes a cartoon strip. The missing cartoon might be from the beginning, middle or end of the given strip.

Missing Pictures - Choose the one of three photographs that completes a given photographic story.

Facial Situations - Choose the one of three verbal descriptions of a situation that fits the expression on both of two photographed faces.

Cognition of behavioral transformations - CBT.

In the Structure of Intellect model, transformations is the product name for changes or redefinitions. In the cognitive-semantic area, transformations ability is indicated by the individual who recognizes that a magnifying glass can start a fire or that a brick can stop a door. In both cases, the function of an object is changed or transformed. The tests constructed for CBT are intended to assess a subject's ability to redefine the meanings of behavioral units (Expression Exchange), behavioral relations (Social Translations), as well as to transform the meaning of behavioral systems (Cartoon Exchange, Picture Exchange). Additionally, a humor test, Who Said It?, was constructed in which much of the humor consists in transforming babies' faces into those of adults.

Expression Exchange - Choose the one of three drawn facial expressions that changes the meaning of a given gesture.

Social Translations - Choose the one of three alternative pairs of people between whom a given verbal statement will have different intentional meaning.

Cartoon Exchange - Choose the one of four alternative cartoons which, when substituted for a designated panel in a Ferd'nand cartoon strip, changes

the meaning of the whole story.

Picture Exchange - Choose the one of three photographs, which when substituted for a given picture in a photographed story, changes the meaning of the whole story.

Who Said It? - Choose the one of four photographed babies' faces (Bannister, 1950; 1952) that fits a given caption.

Cognition of behavioral implications - CBI.

In other content areas of the SI model, the implications product refers to extrapolations in the form of antecedents or consequents. Implications factors have also been demonstrated by tests of sensitivity-to-problems, an act of extrapolation. One CBI test, Cartoon Implications, is based on both the antecedent and consequent definition of implications, while Cartoon Predictions, another CBI test, requires the subject to understand the consequences of behavior. A third CBI test, Reflections, was based on the sensitivity-to-problems definition of this factor.

Cartoon Implications - Choose the one of four verbal statements that describes what precedes or will follow a given Ferd'nand cartoon.

Cartoon Predictions - Choose the one of three alternative cartoons that follows a given cartoon.

Reflections - Choose the one of three alternative interpretations that correctly "reflects" the feeling of a tape-recorded statement. The items for this test were suggested, in part, by patient statements similar to those included in Porter (1950), Porter and Streich (1963), Rogers (1942), and Snyder (1947).

Reference Factors and Marker Tests

A number of tests were included in the battery as measures of well-established factors which might clarify the interpretation of the hypothe-

sized behavioral-cognition factors. For example, it seemed desirable to include marker tests of verbal comprehension (CMU), verbal naming (NMU), and general reasoning (CMS) abilities to ensure that possible variance in performance on the behavioral-cognition tests attributable to these abilities could be identified. The separation of behavioral-cognition factors from these well-established verbal factors is particularly relevant because of early failures in separating these factor domains. Since earlier tests of social intelligence seemed to tap little other than semantic variance, the demonstration that the behavioral-cognition tests are not loaded on known verbal factors is of paramount importance. For this reason, a number of semantic or verbal-factor tests were used. These included, in addition to measures of verbal comprehension, naming, and general reasoning, measures of verbal classification (CMC), verbal analogies (CMR), and conceptual foresight, or sensitivity-to-problems (CMI).

The behavioral tests use unusual test stimuli which might favor more flexible individuals. For this reason, measures of creative-thinking factors were used as indirect indicators of the ability to respond well in unusual situations. The particular divergent-production factors selected were suggested by Weisgerber's (1956) finding that verbal fluency (DMU) and verbal expressiveness (DMT) were related to accuracy in judging emotional expression. For this reason, measures of these two divergent-production factors were included.

Many of the behavioral-cognition tests use Ferd'nand or other cartoon stimuli. Cartoons are not restricted to behavioral tests, however. They have been used to assess semantic abilities as well. For example, a test based on the Louie cartoon strip has been used to define a semantic ordering (NMS) factor (Adkins & Lyerly, 1951). This test, Picture Arrangement, was

included in the present study to determine whether the behavioral tests, particularly those using cartoons, were measures of cartoon or format factors.

Since most of the behavioral tests use a variety of visual stimuli, it was important to determine whether visual (figural) abilities are involved in responding to them. Marker tests of speed of closure (CFU), figural inductive reasoning (CFR) and flexibility of closure (NFT) were used to determine this. Additionally, the figural transformation (NFT) factor had been found by Messick and Damarin (1963) to be related to recall of social stimuli (faces). We thought it would be useful to see whether this relationship exists in the area of behavioral cognition as well.

The two marker tests for each reference factor included in the test battery were chosen because each had defined a reference factor in the past and because each could be administered in a relatively short time. To conserve testing time, we used three tests that the subjects had already taken as part of their school's testing program: the 20-vocabulary items of the Henmon-Nelson Tests of Mental Ability (Lamke & Nelson, 1957) were used as one of the verbal-comprehension measures; the Abstract Reasoning section of the Differential Aptitude Tests (Bennett, Seashore, & Wesman, 1959) was used as a measure of figural reasoning (CFR); and the Quantitative Thinking test in the Iowa Educational Development Series (Lindquist & Bloomers, 1960) was used as a measure of general reasoning (CMS). In all, 24 tests designed to define 12 reference factors were used (see Table 1 for test names and factor designation).

Insert Table 1 about here

Sample

The sample used for this study included 240 eleventh-grade students in a middle-class, primarily Caucasian, urban California community. The mean age of the 110 boys and 130 girls was 16.7 years. The average Henmon-Nelson I Q of 229 of these students was 117.7, with a standard deviation of 16.9 and a range from 83 to 155. The test battery was administered to the students during four of their usual two-hour social studies periods. The test battery was administered to all subjects in the same order.

Statistical Analyses

Although all the behavioral-cognition tests had been pre-tested, additional item analyses were performed using the final-test-battery data. Items with very low item-total correlations were eliminated in order to obtain satisfactory internal-consistency reliability. On the average, one to three items were deleted (i.e., not scored) in a 30-item test. The number of items deleted from each test is given in Appendix A[1]. For tests 16, 31 and 39 (see Table 1) the score is the total number of correct items. For the other behavioral-cognition tests, the total score is the sum of two part-scores, separately corrected for guessing using the formula: number of items correct plus 1/k times the number of items omitted, where k is the number of alternatives[1]. If, by visual inspection, a total score distribution was not normally distributed, an appropriate scaling technique was applied (see Table 1). C-scale (Guilford & Fruchter, 1973), stanine scale, or dichotomization was selected on the bases of score range and skewness.

The 47 factor tests, plus sex (0=female; 1=male), chronological age, mental age, sibling status (0=only or oldest; 1=other), and socio-economic status (1=high through 5=low) were intercorrelated using Pearson correlation coefficients. The variables sex, sibling status, and socio-economic status,

having no correlation greater than .21 and being of secondary interest in terms of the purpose of this study, were excluded from the factor analysis. Mental age, known to be factorially complex, and chronological age were also excluded.

The 47 variable correlation matrix[1], with the highest correlation in each column entered in the diagonal, was submitted to an iterative communality program. The iterated communality estimates were then inserted into the diagonals and 33 principal factors were extracted. The first 22 principal factors extracted were retained since a plot of the eigenvalues of all factors extracted showed a dip after the 21st one.

The 22 principal factors were then submitted to an orthogonal rotation program designed to maximize the similarity of the obtained factor matrix of loadings to a target matrix (Cliff, 1966). The largest number of factors capable of maintaining communalities, using this program, was 19. This number of factors was retained, rather than a smaller number, because it gave a better simple structure solution.

The initial target matrix was patterned in line with our hypotheses, using the square root of each test's communality as its target loading. These loadings were selected not only to maximize the emergence of the hypothesized factors, but to achieve simple structure and to maintain positive manifold. In the final target matrix[1] the sizes of some loadings were changed slightly and not all variables were patterned according to the original hypothesis. Changes in the final target were made so as to achieve simple structure.

RESULTS

The Factors and their Interpretation

The factors found in this study will be discussed primarily in terms of

tests having loadings of .30 or greater. Table 2 contains the 12 hypothesized reference factors. Since these factors have been reported in many other studies (Thurstone, 1944; Wilson, Guilford, Christensen, & Lewis, 1954; Guilford, 1967), and have been discussed in some detail in a technical report (O'Sullivan, Guilford, & deMille, 1965), only two observations need to be made here. The first is that the marker tests predicted to load together did, with few exceptions, do so. Of more importance for the present study is the finding that only one behavioral-cognition test loaded on a reference factor. Despite the use of cartoons and other figural materials, the behavioral-cognition tests clearly assess different aptitudes than the cartoon test, Picture Arrangement, used to measure semantic skill, or the tests using drawings, such as Penetration of Camouflage and Hidden Figures, used to assess figural abilities.

Insert Table 2 about here

What about the one behavioral-cognition test (Reflections) that is loaded on a non-behavioral factor (CMR)? In this test, the examinee is given a tape-recorded "patient" statement and is to choose the "therapist" statement that reflects the feeling in the patient statement. In order to communicate subtle emotional messages, it was necessary to make many of the statements used in this test verbally sophisticated and grammatically complex. The result seems to be that the variance in the test is more dependent on knowing how to use language than on knowing what another person "really" means.

Behavioral Cognition Factors

CBU Cognition of behavioral units

Tests	Loadings
18. Missing Cartoons (CBS)	.41 (CBS .52; CBI .35)
11. Faces (CBU)	.40
16. Inflections (CBU)	.38
8. Expressions (CBU)	.36
30. Questions II (CBU)	.34

Although the behavioral-units factor is led by Missing Cartoons, a test designed to measure CBS, the other four tests defining it are those hypothesized to do so. Missing Cartoons is a complex test with correlations as high as .60 with several CB tests. To answer the items in this test correctly, the facial expressions of each cartoon character must be scrutinized. In the light of this task requirement, its loading on CBU is understandable.

Three of the other four tests defining the CBU factor, Faces, Inflections, and Questions II, assess mainly the ability to understand facial expressions. Inflections was devised to discover whether a vocal inflection could be used to indicate a behavioral unit. However, inspection of subjects' responses to each item suggested that this test's difficulty lay not in the tape-recorded inflections, but in the drawings of the matching facial expressions. The fourth test, Expressions, is the only behavioral-units test in which other than facial expressions were effectively used. Its factor loading pattern, however, is not strongly univocal on CBU. (It has a .27 loading on CBC.) For these reasons, the CBU factor is interpreted, in this analysis, as the ability to understand facial expressions. However, other research (Hendricks et al., 1969) indicates that CBU includes the ability to understand other behavioral units, such as gestures and postures, as well.

CBC Cognition of behavioral classes

Tests	Loadings
10. Expression Grouping (CBC)	.59
26. Picture Exclusion (CBC)	.41

Expression Grouping, a test composed of drawings, and Picture Exclusion, a test with a photographic format, clearly define the hypothesized behavioral-classes factor. The CBC factor is interpreted as the ability to cognize different modes or units of expressions as communicating the same generalized thought or feeling. As with factor CBU, this interpretation of the CBC factor applies to the dimension isolated in the present analysis. Theoretically, the ability to cognize behavioral classes might also be measured by tests in which only one behavioral modality (e.g. only faces, only gestures, etc.) is used.

Odd Strip Out, intended as a test of the ability to classify systems of behavior, is not loaded on this factor. This finding tends to support the interpretation of CBC as a classing-of-units-factor. Sound Meaning, another hypothesized CBC test, has no significant loading on any factor. This may be due to its low reliability.

CBR Cognition of behavioral relations

Tests	Loadings
37. Social Relations (CBR)	.50
36. Silhouette Relations (CBR)	.40
1. Cartoon Analogies (CBR)	.37
40. Stick Figure Opposites (CBR)	.34
38. Social Translations (CBT)	.34 (CBT .51)

All four of the tests designed as measures of the ability to cognize behavioral relations are univocally loaded on this factor. Social Relations

and Silhouette Relations were especially constructed to assess the ability to understand two-person interaction. Although these tests have higher, more univocal loadings than the other two CBR tests, the fact that Cartoon Analogies and Stick Figure Opposites loaded as predicted suggests that though understanding two-person relations is an important aspect of this ability factor, other behavioral relations are involved as well.

The significant loading of Social Translations, a test hypothesized to measure CBT, while not predicted, is understandable. This test emphasizes the different social meanings that a statement may have, when expressed between different pairs of people. Although the cognition of the statement's transformation is an essential operation, this cognition could not occur unless one understands the usual kind of relationship between the alternative pairs. Cognition of the dyadic relation is necessary to cognition of the given transformation.

CBS Cognition of behavioral systems

	Tests	Loadings	
19.	Missing Pictures (CBS)	.58	
18.	Missing Cartoons (CBS)	.52	(CBU .41, CBI .35)
21.	Odd Strip Out (CBC)	.50	(CBT .34)
12.	Facial Situations (CBS)	.42	
3.	Cartoon Implications (CBI)	.41	(CBI .30)

The three tests constructed to measure CBS, the comprehension of a complex social situation, are loaded on this factor. Missing Pictures, a pictorial test, seems to be the best measure of factor CBS, probably because its item situations are simple and little skill is needed to understand the individual expressions used.

Missing Cartoons also has a high loading on this factor. Yet despite

its format, which is very similar to that of Missing Pictures, a univocal CBS test, Missing Cartoons is the most complex test in this battery. In Missing Cartoons, the subject must attend closely to each cartoon character's facial expression. How the pivotal character feels may determine the start or finish of many of the cartoon strips. Missing Cartoons' loading on factor CBU is thus not surprising. In Missing Pictures, on the other hand, since unskilled actors were used, greater reliance was placed on the social situation itself to convey the behavioral information.

Missing Cartoons' loading on the CBI factor is also of interest. Of the missing cartoons in this test, one-third are the fourth or last cartoon in the strip. The subject is to predict what will happen, what will follow from a given situation. The task for these items, then, is like that in Cartoon Predictions, a test hypothesized to measure CBI.

Conversely, only one-third of the items in Cartoon Implications, hypothesized to measure CBI, are of the what-will-happen, predictive type. The remaining items in Cartoon Implications refer to what led up to or preceded the given situation. These "precedent" items organize or explain the given situation. This may be why Cartoon Implications is loaded significantly on factor CBS, and why Missing Cartoons is loaded on the CBI factor.

Considering the splitting of these two tests between factors CBS and CBI, it is suggested that behavioral implications be defined as behavioral predictions. When one makes a prediction, there is usually no way of immediately checking one's response. In understanding systems, however, one can compare both ends with the middle, thus verifying the consistency of one's structuring. Unless the behavior in the strip is highly overdetermined, cartoon strips with the last panel missing would not seem to be suitable stimuli for testing comprehension of behavioral systems.

Facial Situations is a photographic test, similar in format to Social Relations, the leading CBR measure. The significant loading of Facial Situations on the CBS factor may be taken to mean that two people may constitute a system rather than a relationship, so long as they are reacting to a third stimulus rather than to one another. In pretesting Odd Strip Out, it was obvious that this classes-of-systems test demanded a great deal of systems comprehension. Odd Strip Out is not loaded at all on its hypothesized CBC factor, but exhibits much of its variance on the behavioral-systems factor. It seems that understanding the systems in Odd Strip Out contributes most of the variance for this test.

Three of the four tests that use Ferd'nand cartoons, Missing Cartoons, Odd Strip Out, and Cartoon Implications, are loaded on this factor. This cluster might lead one to think that the CBS factor is essentially a Ferd'nand dimension. However, the substantial, univocal loadings of two photographic tests, Missing Pictures and Facial Situations, weakens such an interpretation. It is more likely that factor CBS reflects a behavioral ability rather than one based on format.

CBT Cognition of behavioral transformations

	Tests	Loadings	
25.	Picture Exchange (CBT)	.51	
38.	Social Translations (CBT)	.51	(CBR .34)
9.	Expression Exchange (CBT)	.43	
2.	Cartoon Exchange (CBT)	.40	
21.	Odd Strip Out (CBC)	.34	(CBS .50)
7.	DAT Abstract Reasoning (CFR)	.34	(CFR .66)
45.	Who Said It? (CBT)	.32	

The hyperplane of this factor, identified as the hypothesized CBT factor,

is not as dense as simple structure would demand. The relatively large number of tests designed to measure it, and the consequent over-determination of the factor may be held partially accountable.

The five CBT tests include transformations of units (Expression Exchange, Who Said It?), relations (Social Translations), and systems (Cartoon Exchange, Picture Exchange). Comprehension of each of these product categories underlies comprehension of a transformation performed on it. Although attempts were made to control for it, some factor complexity was expected.

Three of the five behavioral-transformations tests have univocal and substantial loadings on this factor. Picture Exchange and Cartoon Exchange involve understanding a change or redefinition in the meaning of a social system. Expression Exchange is a measure of one's ability to cognize that the same gesture (an expressional unit) may convey many different emotional states. Since tests of both transformed units and transformed systems uniquely define this factor, it would seem that interpretation of this factor should reflect the fact that a transformation occurred, regardless of the product transformed.

Social Translations, in which the behavioral meaning of a verbal statement is redefined, also has a substantial loading on factor CBT. This loading is further evidence that the transformation, rather than the transformed object, is the element common to the variables loaded on factor CBT.

Although the humor test, Who Said It?, did emerge on its hypothesized behavioral factor, its loading is minimal; this may be due to the test's low reliability.

The main loading of Odd Strip Out is on the CBS factor. A .34 loading on the behavioral-transformations factor may be traced to the test task. One must choose the one of three cartoon strips in which Ferd'nand behaves dif-

ferently than he does in the other two. In other words, the subject must cognize a change or transformation in Ferd'nand's personality.

CBI Cognition of behavioral implications

	Tests	Loadings	
4.	Cartoon Predictions (CBI)	.55	
31.	Reflections (CBI)	.36	(CMR .35)
18.	Missing Cartoons (CBS)	.35	(CBS .52; CBU .41)
3.	Cartoon Implications (CBI)	.30	(CBS .41)

The highest and most univocal loading on the CBI factor is for the test, Cartoon Predictions, which was designed to test the consequences or predictions definition of behavioral implications. In discussing the CBS factor, it was suggested that although SI implications factors are usually defined to include both antecedents and consequents, behavioral-implications factors might more accurately be limited to behavioral predictions or foresight. When the consequents are given and antecedents are to be determined, one end of a behavioral sequence may be justified against the other. This organization of a whole may be more appropriately considered a behavioral system. Caution should be exercised in making an interpretation on the basis of essentially one test (Cartoon Predictions), but the CBI factor in this analysis is taken to reflect the ability to make predictions about others' behavior.

Reflections was designed to test the alternative CBI definition of behavioral sensitivity-to-problems. Reflections' loading on the semantic-relations factor, however, is as large as its behavioral loading. Although Reflections seems to measure some aspect of CBI, the scope of CBI was not fully explored in this analysis. Whether sensitivity-to-behavioral problems is a CBI aptitude is a question that must await further research.

DISCUSSION AND IMPLICATIONS

Some might disagree with our interpretation of the six new factors as representing dimensions in a domain called social or behavioral intelligence. Factor interpretation and naming is, of course, easily biased, and factor analysis provides only partial construct validation, at best. This study has demonstrated that tests hypothesized to measure behavioral cognition as defined by SI theory do not load on verbal or figural factors. This is one kind of discriminant validation (see also, Tenopyr, 1966; Jung, 1972; Hendricks et al., 1969).

What is needed now is convergent validation, to see whether the behavioral-cognition tests correlate with real-life criteria of social intelligence. Some preliminary evidence indicates that this is indeed the case. Shipe, Rosser, and Sidhu (1973) have found that some of the behavioral-cognition tests developed in this study, in combination with personality variables, correlate with peer preference. Behavioral cognition scores have been found to be related to IBM salesmen's success (Gershon, 1966) and ratings of probation officer trainees by their supervisors (Schwartz, 1968).

Although the stimuli used in the behavioral-cognition tests are highly schematic (drawings, cartoons, etc.) they do represent middle-class white Americans. As such, their applicability to non-white, non-middle-class groups should not be assumed. In a pilot study of 50 lower-class, high-school students, however, it was found (O'Sullivan, 1973) that black students who performed more poorly than white students on a vocabulary test did better on behavioral-cognition tests.

Given the need and demand on the part of government and student consumers for education to become more relevant, more related to life, the existence of factors such as those suggested by this study should not be over-

looked. The need for people to work with data, in Cross's (1974) terms, seems to be declining. On the other hand, social changes such as longer life spans, more rapid communication, greater urbanization, and more leisure time have provided a large number of people with the inclination and the opportunity to contemplate the quality of their lives and the nature of their relationships with the world and other people. The need for the abilities involved in working with people is clear. The factors suggested in this study are a beginning step toward conceptualizing these abilities and developing ways in which they may be improved.

SUMMARY

Given the need to develop social-cognitive abilities in today's students, this study proposed: (1) to demonstrate the existence of a factorial domain which could be called social intelligence or behavioral cognition; (2) to establish that this factorial domain includes the six factors of behavioral cognition predicted by the Structure of Intellect model; and (3) to provide reliable, factorially unique measures of these six behavioral-cognition factors.

In order to establish that the hypothesized behavioral-cognition factors define an area of intellectual ability that was previously undiscovered, marker tests for as many refenence factors as were thought germane were included in the test battery. Nine factors of semantic or verbal ability were measured, including three factors of creative thinking (DMU, DMT, CMI). Since many of the behavioral tests used visual stimuli, measures of three figural-ability factors were included as well.

The 18 obtained factors (12 reference factors, plus six behavioral factors) corresponded closely to the 18 factors hypothesized. Considering the highest, significant loading of each test, only four of the 47 tests used in

this analysis were not loaded as hypothesized. The 12 reference factors were easily identified. These reference dimensions were chosen to sample all known intellectual factors that might confound interpretation of the behavioral factors. Therefore, the newly found behavioral-cognition factors may justifiably be said to reflect abilities separate from previously recognized intellectual abilities.

All six of the behavioral-cognition factors hypothesized were identified in this analysis, whereas no similar set of social intelligence dimensions had been discovered previously. The relevance of these factors for curriculum development as well as extra-academic competence was indicated.

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Footnotes

*. This study was conducted at the Aptitudes Research Project, University of Southern California, under Cooperative Research Project 1976 with the Office of Education, U. S. Department of Health, Education and Welfare. We wish to thank Richard de Mille, Lynn Rehm, Peter Plagens and Walter Gabrielson for their help in test development.

1. This entire paper, as well as supplementary material including sample items, scoring formulas, number of parts per test, working time allowed, the correlation matrix, rotated and unrotated factor matrices and target matrix have been depostied with the Tests and Measurement Center of ERIC document #TM004826.

Table 1

Means, Standard Deviations, Distributions, Scalings, and Reliabilities of Scores

Test Name and Code[a]	Mean	Standard deviation	Form of distribution[b]	Scaling[c]	Reliabilities[d] K	S-B	h^2
1. Cartoon Analogies CBR03A	13.5	2.7	N		.45	.25	
2. Cartoon Exchange CBT01A	14.6	5.0	P	C	.84	.81	
3. Cartoon Implications CEI01A	28.2	3.9	N-		.75	.71	
4. Cartoon Predictions CBI03A	22.6	3.9	N-		.79	.70	
5. Consequences - obvious (DMU)	22.7	6.6	P	C		.77	
6. Consequences - remote DMT03B	4.5	3.2	T+	S		.60	
7. DAT Abstract Reasoning (CFR)	79.5	21.0	T-	D			.94
8. Expressions CBU01A	24.1	3.6	N		.64	.57	
9. Expression Exchange CBT04A	16.1	5.5	P	C	.83	.81	
10. Expression Grouping CBC04A	20.2	3.1	N		.62	.58	
11. Faces CBU02A	18.9	2.4	N		.37	.39	
12. Facial Situations CBS03A	16.1	2.2	N-		.31	.24	
13. Figure Matrix Test CFR02A	4.2	1.4	N		.43		
14. Henmon-Nelson Vocabulary (CMU)	13.1	3.4	N		.84		
15. Hidden Figures NFT04A	8.7	3.1	N		.72		
16. Inflections CBU04A	20.8	2.4	N		.26	.26	
17. ITED Quantitative Thinking (CMS)	79.9	21.5	T-	D			.86
18. Missing Cartoons CBS01A	21.9	3.9	N-		.77	.75	
19. Missing Pictures CBS04A	14.6	2.7	N		.53	.48	
20. Mutilated Words CFU03A	11.9	3.4	N				.45
21. Odd Strip Out CBC02A	12.8	2.4	N-		.60	.53	
22. Penetration of Camouflage NFT02A	6.8	2.5	N				.44
23. Pertinent Questions CMI02B	11.7	2.5	N-				.56
24. Picture Arrangement NMS02B	6.8	2.5	T-	D	.21		
25. Picture Exchange CBT03A	11.0	2.6	N		.43	.38	
26. Picture Exclusion CBC05A	13.3	2.5	N		.34	.35	
27. Picture-Group Naming NMU03A	5.2	1.5	L		.39		
28. Plot Titles - low quality DMU05A	7.3	4.4	N++	C		.53	
29. Plot Titles - high quality DMT01E	6.4	3.5	N++	C		.62	
30. Questions II CBU03A	22.8	3.1	N		.50	.52	
31. Reflections CBI04A	10.9	2.6	N		.43	.45	
32. Seeing Problems CMI03A	12.1	3.3	N				.53
33. Seeing Trends I NMU01A	4.6	2.6	N		.77		
34. Sentence Order NMS03B	6.2	1.6	N		.43		
35. Ship Destination Test CMS02B	23.9	9.3	P	C			.52
36. Silhouette Relations CBR05A	14.1	2.9	N		.45	.35	
37. Social Relations CBR02A	13.4	2.2	N		.29	.20	
38. Social Translations CBT02A	17.5	4.5	N-		.86	.84	
39. Sound Meaning CBC06A	23.4	2.0	N		.36	.29	
40. Stick Figure Opposites CBR04A	17.7	3.6	N		.65	.62	
41. Street Gestalt Completion CFU05A	11.5	2.6	N				.41
42. Verbal Analogies I CMR01B	8.9	2.0	N-		.50		
43. Verbal Classification CMC02B	28.4	7.2	P	C			.70
44. Verbal Comprehension CMU02C	14.1	3.3	N		.78		
45. Who Said It? CBT05A	13.2	2.2	N		.25	.21	
46. Word Classification CMC01A	11.6	2.0	N		.38		
47. Word Matrix Test CMR02A	6.6	1.9	N		.53		
48. Sex	.5	.5					
49. Sibling Status	.5	.5					
50. Socio-Economic Status	2.5	1.5	T+	D			
51. Mental Age (Henmon-Nelson)	22.3	4.1	T-				
52. Chronological Age	16.7	.4	N				

[a] In the code designation of tests, the first three letters refer to the hypothesized factor content of the test. Letters in parentheses represent the hypothesized factor content of tests without code numbers.

[b] The code for distribution forms is the following: N, normal; P, platykurtic; L, leptokurtic; T, truncated; -, slight negative skew; +, slight positive skew; ++, strong positive skew.

[c] The code for scaling of scores is the following: C, C-scaled; S, stanine-scaled; D, dichotomized at the median.

[d] The code for reliability estimates is the following: K, general Kuder-Richardson formula; S-B, Spearman-Brown estimate of whole-test reliability from inter-part correlations; h^2, communality as a lower-bound estimate of reliability.

Table 2

Loadings of Measures on Reference Factors

CMU - Cognition of semantic units		
Verbal Comprehension (CMU)	.71	
Henmon-Nelson Vocabulary (CMU)	.65	
CMC - Cognition of semantic classes		
Verbal Classification (CMC)	.49	(CMR .33)
Word Classification (CMC)	.36	
Sentence Order (NMS)	.30	
CMR - Cognition of semantic relations		
Word Matrix Test (CMR)	.55	
Verbal Analogies I (CMR)	.37	
Reflections (CBI)	.35	(CBI .36)
Verbal Classification (CMC)	.33	(CMC .49)
CMS - Cognition of semantic systems		
ITED Quantitative Thinking (CMS)	.65	
Ship Destination Test (CMS)	.37	
Figure Matrix Test (CFR)	.33	(CFR .37)
CMI - Cognition of semantic implications		
Seeing Problems (CMI)	.57	
Pertinent Questions (CMI)	.41	
Consequences - obvious (DMU)	.40	(DMU .45)
CFU - Cognition of figural units		
Street Gestalt Completion (CFU)	.45	
Mutilated Words (CFU)	.45	(NFT .34)

CFR - Cognition of figural relations		
DAT Abstract Reasoning (CFR)	.66	(CBT .34)
Figure Matrix Test (CFR)	.37	(CMS .33)
NMU - Convergent production of semantic units		
Seeing Trends I (NMU)	.37	
Picture-Group Naming (NMU)	.35	
NFT - Convergent production of figural transformations		
Penetration of Camouflage (NFT)	.45	
Hidden Figures (NFT)	.39	
Mutilated Words (CFU)	.34	(CFU .45)
DMU - Divergent production of semantic units		
Plot Titles - low quality (DMU)	.69	
Consequences - obvious (DMU)	.45	(CMI .40)
DMT - Divergent production of semantic transformations		
Consequences - remote (DMT)	.69	
Plot Titles - high quality (DMT)	.43	
NMS - Convergent production of semantic systems		
Picture Arrangement (NMS)	.67	

Note.- All loadings greater than .30 are indicated. Letters in parentheses following the test name indicate the hypothesized factor content. Letters and numbers in parentheses indicate non-univocal factor loadings.

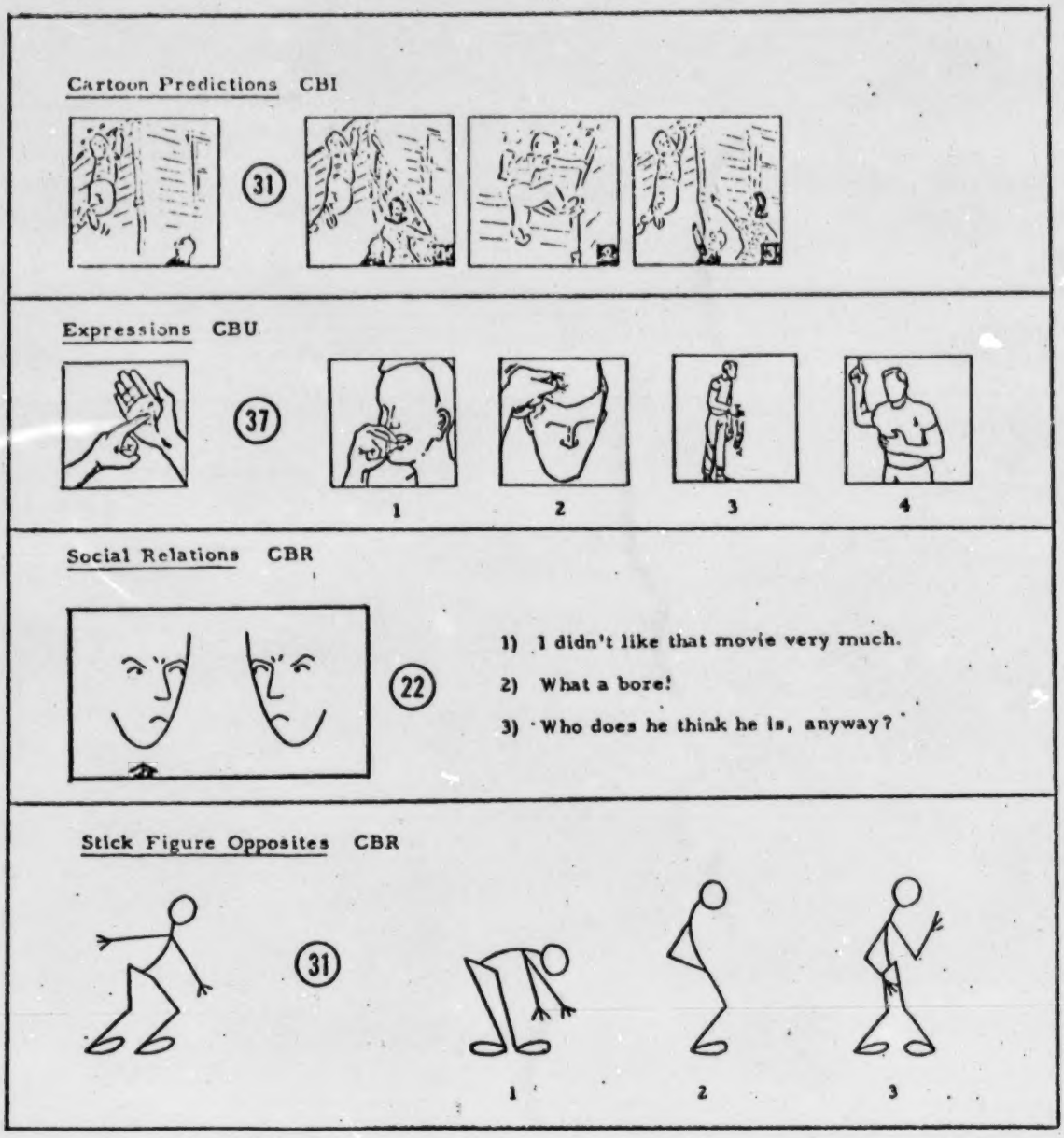
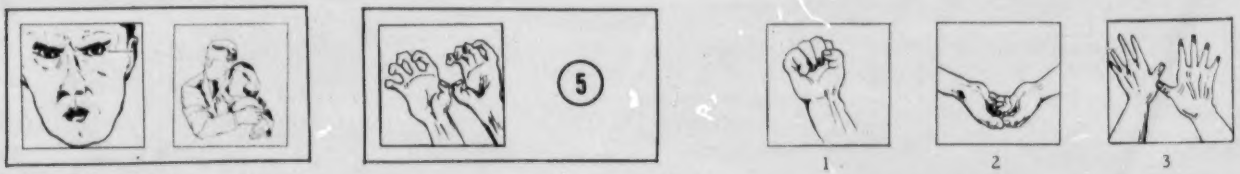


Fig. 1. Sample test items from the behavioral-cognition tests. Items are reduced in size by more than 50 percent. The task for each test is given in the description of the experimental tests.

APPENDIX A

Description of Variables [1]

1. Cartoon Analogies CBR03A. Which alternative expression is related to the third given expression in the same way the second given expression is to the first?



Answer: 3. Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part [2]: 10/15, 12/15; working time: 10 minutes.

2. Cartoon Exchange CBT01A [3]. Which alternative, when substituted for the cartoon indicated by the arrow, will change the meaning of the story by changing the intentions of the characters?

Answer: 2.
Score: number of items right plus one-fourth of the number omitted.
Parts: 2; items per part: 12/13, 12/13;
working time: 16 minutes.

3. Cartoon Implications CBI01A. Which statement describes what happened before, or will happen after the situation shown?

1. The man recognized Ferd'nand as a friend.
2. The salesman will bring a better fitting jacket.
3. The man will say how sorry he is.
4. The man was looking all over for Ferd'nand.

Answer: 3. Score: number of items right plus one-fourth of the number omitted.
Parts: 2; items per part: 18/18, 16/18; working time: 12 minutes.

4. Cartoon Predictions CBI03A. Which alternative situation can be predicted from the given one?

Answer: 1. Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part: 15/15, 14/15; working time: 8 minutes.

5. Consequences - obvious (DMU) [4]. Write as many different results of an unusual situation as possible.

Score: one point for each response that would be a direct result of the given situation, including very general results. Parts: 4; items per part: 1; working time: 8 minutes.

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[1] Drawn and photographed stimuli are 25 to 50 per cent smaller than actual test size. Circled numbers are item numbers.

[2] Numerator is the number of items scored per part; denominator, the number of items administered.

[3] Ferd'nand cartoons in tests 2, 3, 18, and 21 used by permission of United Feature Syndicate.

[4] Tests 5, 6, 23, 35, and 44 were adapted by permission of Sheridan Supply Company, Beverly Hills, California.

6. Consequences - remote DMT03B. Write as many different results of an unusual situation as possible.

Score: one point for each response that indicates an indirect result or an uncommon adaptation to the given situation. Parts: 4; items per part: 1; working time: 8 minutes.

7. Differential Aptitude Test - Abstract Reasoning (CFR). Choose the one of five alternative figures that completes a four-figure series.

Score: number of items right minus one-fourth of the number wrong. Scores converted to nationally-normed percentiles. Parts: 1; items per part: 50; working time: 25 minutes.

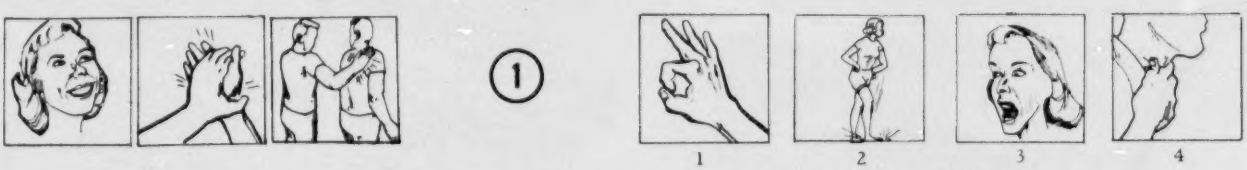
8. Expressions CBU01A. Which alternative expresses the same thought, feeling, or intention as the given?

Answer: 4. Score: number of items right plus one-fourth of the number omitted.
Parts: 2; items per part: 18/18, 14/18; working time: 10 minutes.

9. Expression Exchange CBT04A. Which alternative facial expression changes the meaning of the gesture?

Answer: 2. Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part: 14/15, 14/15; working time: 10 minutes.

10. Expression Grouping CBC04A. Which alternative expression belongs with the given group of expressions?



Answer: 1. Score: number of items right plus one-fourth of the number omitted.
Parts: 2; items per part: 12/15, 14/15; working time: 10 minutes.

11. Faces CBU02A[5]. Which man's face expresses the same feeling or intention as the woman's?

Answer: 4. Score: number of items right plus one-fourth of the number omitted.
Parts: 2; items per part: 11/15, 14/15; working time: 8 minutes.

12. Facial Situations CBS03A. Which situation fits the expressions in both photographs?

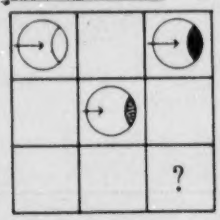
1

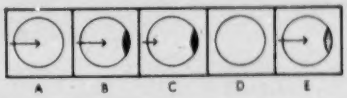
1. He has finally found a job.
2. They are watching a beauty contest.
3. The water is too cold for swimming.

Answer: 2. Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part: 11/15, 10/15; working time: 12 minutes.

[5] Lightfoot and Frois-Wittman photographs used in tests 11, 12, and 36 obtained from the Brown University Photo Laboratory.

13. Figure Matrix CFR02A. Which alternative figure can be substituted for the question mark in the matrix?



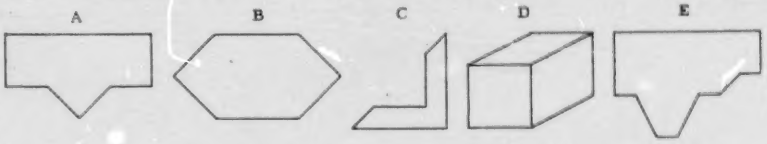


Answer: C.
Score: number of items right plus one-third of the number omitted.
Parts: 1; items per part: 7/8; working time: 3 minutes.

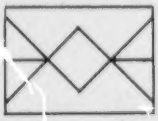
14. Henmon-Nelson Vocabulary (CMU). Which alternative word has the same meaning as the given word? Which alternative correctly completes a given sentence? Items 10, 20, 24, 30, 36, 46, 50, 51, 55, 68, 71, 73, 75, 76, 79, 81, 83, 85, 87, and 89 of the Henmon-Nelson Tests of Mental Ability, Form A were scored as measures of the verbal-comprehension factor.

Score: number of items right plus one-fifth of the number omitted.
Parts: 1; items per part: 20/90; working time; 30 minutes.

15. Hidden Figures NFT04A. Which one of the Five Basic Figures is hidden in the sample item figure?

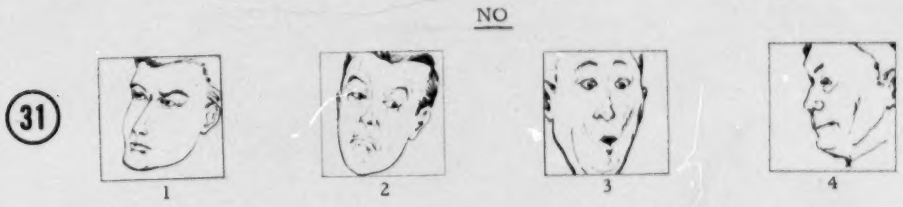


Sample item.



Answer: A. Score: number of items right minus one-fourth of the number wrong.
Parts: 1; items per part: 15; working time: 3 minutes.

16. Inflections CBU04A (auditory). Which alternative facial expression goes with the inflection of a tape-recorded word or phrase? (Male and female items were alternated.)



Score: number of items right. Parts: 2; items per part: 13/15, 14/15; working time: 12 minutes.

17. Iowa Tests of Educational Development - Quantitative Thinking (CMS). Solve a variety of mathematical problems.

Score: number of items right. Scores converted to nationally-normed percentiles.
Parts: 1; items per part: 53; working time: 40 minutes.

18. Missing Cartoons CBS01A. Which alternative completes the cartoon strip, making sense of the thoughts and feelings of the characters?

Answer: 4. Score: number of items right plus one-fourth of the number omitted.
Parts: 2; items per part: 14; working time: 16 minutes.

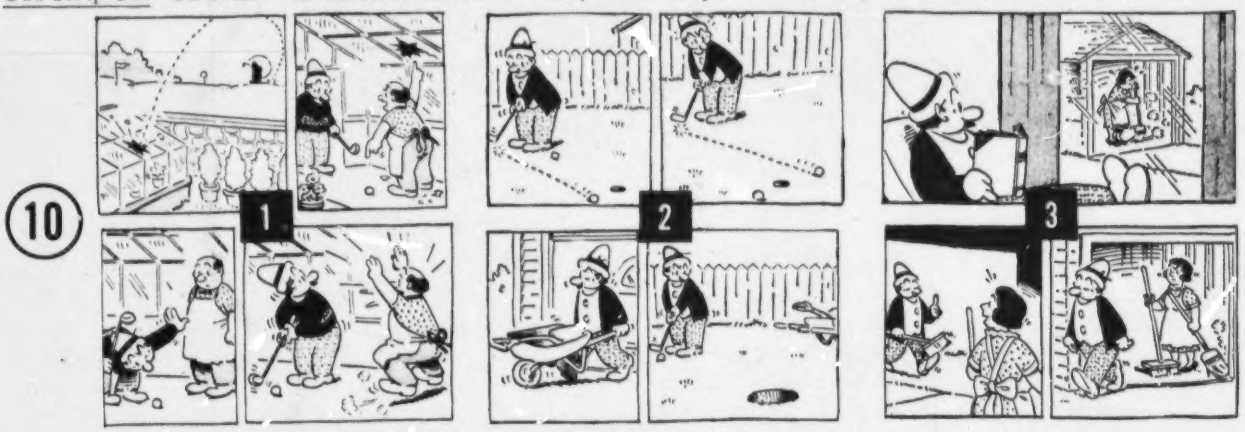
19. Missing Pictures CBS04A. Which alternative completes the story, making sense of the thoughts and feelings of the actors?

Answer: 3.
Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part: 11/14, 10/14; working time: 16 minutes.

20. Mutilated Words CFU03A[6]. Identify words in which parts of each letter are missing.

Answer: house. Score: one point for each correct response.
Parts: 1; items per part: 26; working time: 3 minutes.

21. Odd Strip Out CBC02A. In which situation does Ferd'nand respond differently than he does in the other two?



Answer: 2. Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part: 9/10, 8/10; working time: 12 minutes.

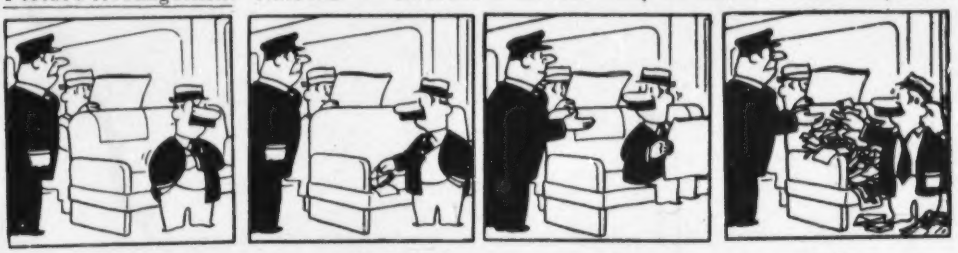
22. Penetration of Camouflage NFT02A[7]. Circle the human faces camouflaged in the lines of a realistic drawing.

Score: one point for each correct response. Parts: 1; items per part: 13; working time: 2 minutes.

23. Pertinent Questions CMI02B. Write four questions the answers to which would serve as a basis for making a decision in a given situation.

Score: one point for each correct response. Parts: 1; items per part: 4; working time: 6 minutes.

24. Picture Arrangement NMS02B[8]. Reorder a cartoon strip so that it makes temporal sense.



2 3 1 4

Score: one point for each completely correct ordering. Parts: 1; items per part: 8. working time: 3 minutes.

[6] Tests 20, 41, and 43 were adapted by permission from tests by L. L. Thurstone.
[7] Adapted by permission from the Army Air Force test of the same name.
[8] Adapted by permission from Dorothy C. Adkins' adaptation of Press Features' cartoon strip LOUIE.

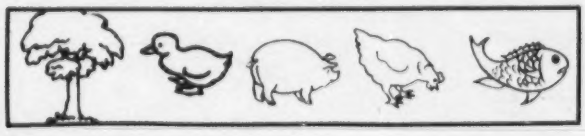
25. Picture Exchange CBT03A. Which alternative, when substituted for the picture indicated by the arrow, will change the meaning of the story?

Answer: 2. Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part: 9/12, 9/12; working time: 16 minutes.

26. Picture Exclusion CBC05A. Which photographed expression does not belong with the other three?

Answer: 3. Score: number of items right plus one-fourth of the number omitted.
Parts: 2; items per part: 10/15; 11/15; working time: 10 minutes.

27. Picture-Group Naming NMU03A [9]. Write a class name for five pictured objects.



living things

Score: one point for each correct response. Parts: 1; items per part: 9; working time: 2 minutes.

28. Plot Titles - low quality DMU05A. Write as many appropriate titles as possible for a given short story (Part 1). Write as many clever titles as possible for a second short story (Part 2).

Score: one point for each title that is relevant but not remote or clever.
Parts: 2; items per part: 1; working time: 7 minutes.

29. Plot Titles - high quality DMT01E. Write as many appropriate titles as possible for a given short story (Part 1). Write as many clever titles as possible for a second short story (Part 2).

Score: one point for each title that is especially succinct or clever, or that indicates a reinterpretation of the plot.
Parts: 2; items per part: 1; working time: 7 minutes.

[9] Tests 27 and 34 were adapted by permission of the University of North Carolina and the Office of the Adjutant General.

30. Questions II CBU03A[10]. Which question might result in the pictured expression?

(7)

1. Can you remember the first line of the Constitution?
2. Don't you think that girl's short skirt is a scandal?
3. Isn't that your wife's car?
4. Did you enjoy your vacation?

Answer: 2. Score: number of items right plus one-fourth of the items omitted.
Parts: 2; items per part: 15; working time: 12 minutes.

31. Reflections CBI04A (auditory)[11]. Which alternative statement expresses the attitude or feeling underlying the given statement?

Sample Item 8. "I'm just wondering how I'll act - I mean how things will turn out."

1. She's looking forward to it.
2. She's worried about it.
3. She's interested in how things will work out.

Answer: 2. Score: number of items right. Parts: 3; items per part: 6/7, 5/7, 7/7; working time: 10 minutes.

32. Seeing Problems CMI03A. Write as many as five problems connected with a common object.

Sample item. CANDLE Answers: 1. How to light it.
2. Keeping it from falling over.

Score: one point for each problem concerned with the use, shape, or composition of the given object.
Parts: 1; items per part: 5; working time: 3 minutes.

33. Seeing Trends I NMU01A. Identify the meaningful trend in a group of words.

mouse rat lion pig cow horse elephant

Answer: animals become larger

Score: one point for each correct response. Parts: 1; items per part: 10; working time: 3 minutes.

34. Sentence Order NMS03B. Arrange three sentences in a meaningful order.

2 She bought some food at the market.

3 She returned home and cooked some of the food she had bought.

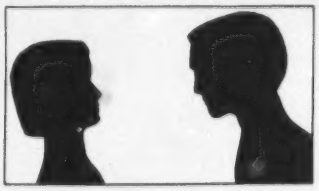
1 She went to the market.

Score: one point for each completely correct ordering. Parts: 1; items per part: 10; working time: 3 minutes.

35. Ship Destination Test CMS02B. Find the distance of a ship to a port, taking into account the influence of an increasing number of variables.

Score: number of items right minus one-fourth of the number wrong.
Parts: 1; items per part: 48; working time: 8 minutes.

36. Silhouette Relations CBR05A[12]. Which photograph expresses the individual's feeling or intention in the silhouette relationship? In part one of the test, the alternative pictures are of men. In part two, they are of women.



(22)

1

2

3

Answer: 1. Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part: 11/15, 12/15; working time: 10 minutes.

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[10] Fernandel photographs used by permission of Phillippe Halsman.

[11] Items adapted by permission from material of E. H. Porter, Jr., C. R. Rogers, W. U. Snyder, and E. R. Streich.

[12] Silhouettes adapted by permission of R. H. Knapp.

37. Social Relations CBR02A[13]. Which statement expresses the feeling of the face indicated by the arrow, taking into account the relationship between the faces?

(22)

1) I didn't like that movie very much.
2) What a bore!
3) Who does he think he is, anyway?

Answer: 3. Score: number of items right plus one-third of the number omitted.
Parts: 3; items per part: 5/7, 7/7, 7/7; working time: 6 minutes.

38. Social Translations CBT02A. Between which alternative pair will the given statement have a different intention or meaning?

parent to child

"I don't think so."

1) teacher to student
2) student to teacher
3) student to student

Answer: 2. Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part: 11/12, 12/12; working time: 8 minutes.

39. Sound Meaning CBC06A (auditory). Which one of four words is the best name for a group of three expressive sounds?

Score: number of items right. Parts: 2; items per part: 14/15, 13/15; working time: 14 minutes.

40. Stick Figure Opposites CBR04A. Which stick figure expresses a feeling or intention opposite that of the given one?

(31)

1 2 3

Answer: 2. Score: number of items right plus one-third of the number omitted.
Parts: 2; items per part: 12/15, 13/15; working time: 8 minutes.

41. Street Gestalt Completion CFU05A. Identify pictured objects having missing parts.

Answer: rabbit.
Score: one point for each correct response.
Parts: 1; items per part: 24; working time: 3 minutes.

42. Verbal Analogies I CMR01B. Which alternative is related to the third given word in the same way that the second given word is to the first?

CLOTH : DYE as HOUSE : ?

A. shade
B. paint
C. brush
D. wood

Answer: B. Score: number of items right plus one-fourth of the number omitted.
Parts: 1; items per part: 12/15; working time: 4 minutes.

43. Verbal Classification CMC02B. Given two classes of four words each, decide whether each of eight different words belongs to one class or the other or to neither.

COW	___ desk	✓	TABLE
HORSE	✓ sheep	___	CHAIR
GOAT	___ rocker	✓	BOOKCASE
DOG	___ tree	___	LAMP
	✓ cat	___	
	___ nose	___	
	___ dresser	✓	
	✓ donkey	___	

Score: number of items right minus one-half of the number wrong. Parts: 1; items per part: 5; working time: 4 minutes.

[13] Faces adapted by permission of R. H. Knapp.

44. Verbal Comprehension CMU02C (Guilford-Zimmerman Aptitude Survey, Part I). Which one of five alternatives has the same meaning as a given word?

Score: number of items right plus one-fifth of the number omitted.
Parts: 1; items per part: 22/24; working time: 4 minutes.

45. Who Said It? CBT05A[14]. Which baby's expression fits the caption?

Item 7. Another martini? Oh, I really don't think I should.

1 2 3 4

Answer: 3. Score: number of items right plus one-fourth of the number omitted.
Parts: 2; items per part: 10/12, 10/12; working time: 8 minutes.

46. Word Classification CMC01A. Which word does not belong with the others?

Sample item. A. horse B. cow C. man D. flower

Answer: D. Score: number of items right plus one-fourth of the number omitted.
Parts: 1; items per part: 16/20; working time: 4 minutes.

47. Word Matrix Test CMR02A. Which alternative completes the matrix?

Sample item.	ground	street	automobile	A. airplane	D. balloon
	air	route	_____	B. bird	E. cloud
				C. kite	

Answer: A. Score: number of items right. Parts: 1; items per part: 10; working time: 3 1/2 minutes.

48. Sex. Females were assigned the code value 0; males, 1.

49. Sibling Status. Only and oldest children were coded 0; others were coded 1.

50. Socio-Economic Status. Hollingshead's seven-point Socio-Economic Factor index was used as follows: 1, executives and major professionals; 2, managers and lesser professionals; 3, administrative personnel and semi-professionals; 4, clerical workers and technicians; 5, skilled manual employees; 6, semi-skilled employees; 7, unskilled employees.

51. Mental Age (Henmon-Nelson). This "score" was determined in the manner described in the Henmon-Nelson Tests of Mental Ability, Form A manual.

52. Chronological Age. Each examinee's age at the time of testing was determined to the nearest month.

[14] Baby photographs used by permission of Constance Bannister.

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1. Cartoon Analogies		21	35	26	08	-01	28	28	24	34	15	21	00	18	14	25	12	29	21	10	35
2. Cartoon Exchange	21		32	29	02	16	48	33	25	28	09	22	30	38	32	18	53	45	29	17	40
3 Cartoon Implications	35	32		40	08	15	44	42	28	47	22	29	24	47	30	32	42	61	41	23	51
4. Cartoon Predictions	26	29	40		13	07	40	32	16	35	07	25	26	31	26	19	37	45	32	20	38
5. Consequences - obvious	08	02	08	13		00	07	12	03	08	08	19	05	07	10	11	10	06	07	01	09
6. Consequences - remote	-01	16	15	07	00		07	11	08	16	04	-02	-01	19	07	04	24	07	05	02	15
7 DAT Abstract Reasoning	28	48	44	30	07	07		34	24	28	-01	16	42	43	55	18	48	47	14	23	49
8 Expressions	28	33	42	32	12	11	14		21	51	25	20	25	32	21	35	33	49	32	17	41
9 Expression Exchange	21	25	24	16	06	10	24	21		27	07	05	10	34	17	14	25	29	25	9	31
10. Expression Synonyms	34	33	47	35	05	11	28	31	27		24	8	29	27	20	26	29	42	37	13	41
11. Faces	15	09	22	07	08	04	-01	23	07	24		19	16	04	01	21	11	24	16	-01	16
12. Facial Situations	21	22	29	25	19	-02	16	20	05	31	19		13	15	11	23	11	20	26	11	24
13. Figure Matrix Test	00	30	24	26	05	-01	32	25	10	26	16	13		31	35	08	44	30	21	12	30
14. Henmon-Nelson Vocabulary	18	38	47	31	07	19	43	32	34	27	04	15	31		36	25	58	41	29	23	43
15. Hidden Figures	14	32	30	26	10	07	55	21	17	20	01	11	35	36		14	47	32	22	32	31
16. Inflections	25	16	32	19	11	04	18	33	19	36	21	23	08	25	14		22	37	30	23	30
17. ITED Quantitative Thinking	12	53	42	37	10	24	48	33	23	29	11	11	44	58	47	22		46	26	23	40
18. Missing Cartoons	29	45	61	45	06	07	47	49	28	40	24	20	30	41	32	37	46		40	22	60
19. Missing Pictures	21	29	41	32	07	06	14	32	25	37	18	26	21	29	22	30	26	40		19	46
20. Mutilated Words	10	17	23	20	03	02	23	17	06	19	-01	11	12	23	22	22	24	22	19		23
21. Odd Strip Out	30	40	51	38	09	05	40	43	31	38	18	24	30	43	31	30	40	00	48	23	
22. Penetration of Camouflage	17	25	28	20	08	17	24	23	07	25	-03	11	25	32	27	18	39	29	16	29	22
23. Pertinent Questions	17	34	28	24	29	38	28	21	19	28	14	16	15	28	28	19	44	26	21	12	24
24. Picture Arrangement	16	17	30	19	14	14	22	21	26	21	-03	00	25	27	18	18	35	37	19	04	25
25. Picture Exchange	24	37	41	40	00	11	32	35	29	40	14	15	30	39	29	26	43	42	31	19	41
26. Picture Exclusion	25	22	19	16	08	05	27	22	15	29	06	10	05	20	14	15	10	18	09	11	21
27. Picture-Group Naming	04	25	32	26	05	26	28	12	15	23	05	06	16	37	21	14	26	24	22	22	28
28. Plot Titles - low quality	-01	-06	-12	00	26	09	-13	-09	-12	-02	-01	-08	08	-06	-06	-13	03	-17	-06	-04	-08
29. Plot Titles - high quality	01	24	24	17	15	42	20	29	18	35	07	14	13	36	19	13	28	27	15	13	24
30. Questions II	21	30	40	18	05	-03	28	18	20	21	14	20	13	30	21	25	34	35	25	15	31
31. Reflections	17	32	26	30	06	10	29	33	32	36	09	19	26	40	19	18	37	33	26	08	25
32. Seeing Problems	17	13	24	15	29	29	15	20	13	26	16	13	02	28	15	20	25	18	16	03	15
33. Seeing Trends I	01	25	14	12	08	07	35	16	11	14	11	09	18	31	33	17	38	27	02	25	17
34. Sentence Order	23	29	33	18	-02	04	25	18	26	18	11	09	14	44	24	18	37	29	27	17	30
35. Ship Destination Test	17	34	35	30	14	10	49	25	21	20	12	10	31	40	43	17	59	36	25	27	31
36. Silhouette Relations	15	14	23	17	07	-02	18	16	15	33	09	21	09	16	13	12	20	25	15	01	20
37. Social Relations	21	17	20	23	-04	01	15	11	18	15	14	12	13	21	09	09	23	11	16	08	14
38. Social Translations	22	31	31	20	11	12	40	34	36	22	18	15	14	39	24	20	33	33	34	06	41
39. Sound Meaning	22	23	29	17	-02	13	26	26	24	14	12	24	34	15	14	32	26	22	06	26	
40. Stick Figure Opposites	20	19	27	15	00	07	17	29	18	28	20	14	15	28	16	16	30	29	21	15	32
41. Street Gestalt Completion	15	11	28	28	07	14	23	26	12	23	-02	17	08	25	23	23	16	33	17	28	23
42. Verbal Analogies I	17	35	36	20	-06	15	41	28	24	30	10	16	32	50	33	18	47	34	29	20	42
43. Verbal Classification	20	30	36	31	04	11	48	26	23	29	15	10	27	53	38	32	53	41	27	28	33
44. Verbal Comprehension	15	40	41	26	02	18	39	40	28	30	08	20	29	78	31	27	56	43	23	24	39
45. Who Said It?	07	13	19	17	07	04	18	12	15	12	02	13	09	17	07	19	15	11	08	17	12
46. Word Classification	14	34	37	24	10	07	48	35	17	32	14	19	23	48	25	22	41	34	27	11	30
47. Word Matrix Test	15	37	35	31	01	16	51	39	28	36	11	19	27	48	30	23	61	41	24	13	34
48. Sex	-17	07	-03	01	-21	12	-01	01	-08	-03	-17	-12	06	-02	04	-03	24	01	-07	04	-04
49. Sibling Status	02	-04	00	00	-03	-18	00	-04	-03	02	02	00	04	-03	04	08	-11	06	02	-06	06
50. Socio-economic Status	-08	-18	-08	-14	05	-10	-15	-19	-04	-13	-03	-05	-10	-21	-11	-01	-12	-16	-03	03	-11
51. Mental Age (Henmon-Nelson)	20	45	46	35	09	20	38	33	32	32	09	15	32	83	43	24	59	44	29	26	41
52. Chronological Age	-20	-13	-17	-19	-04	-04	-18	-06	-09	-08	-11	-10	-11	-24	-15	-14	-18	-17	-05	-16	-04

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22	24	25	41	21	28	-06	24	31	35	15	17	30	31	20	14	41	26	32	23	42	33	39	12	30	34	-09	06	-11	41	-06
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18		19	27	12	33	14	40	27	27	42	26	15	32	11	07	27	16	14	20	23	26	26	11	28	31	09	-07	-08	42	-20
23	19		32	-04	12	04	12	22	25	08	10	14	29	19	01	17	15	22	25	12	34	18	03	18	16	-01	02	-04	19	04
19	27	32		03	18	-12	24	25	39	16	23	26	32	12	16	38	25	31	18	35	32	37	18	28	40	03	10	-15	37	-11
17	12	-04	03		14	-07	12	14	23	15	04	13	12	03	15	06	04	05	13	14	14	15	10	16	16	-15	-15	-08	19	-06
19	33	12	18	14		-04	30	20	19	17	18	19	28	02	16	16	22	09	19	22	26	29	20	27	22	03	04	-07	38	-09
11	14	04	-12	-07	-04		-03	12	-08	21	-21	-16	-07	03	00	-06	-20	-10	-14	-02	-12	-18	01	-05	-15	-10	04	-14	-03	-03	
20	40	12	24	12	30	-03		12	25	35	31	19	22	04	04	24	15	14	19	31	23	37	13	26	28	20	-03	-15	35	-18
12	27	22	25	14	20	12	12		19	17	14	22	22	11	20	21	20	22	14	14	38	32	20	24	23	-08	-02	-01	37	-18
14	27	25	39	25	19	-08	25	19		10	12	17	25	17	25	28	25	19	22	31	33	33	13	29	45	-03	04	-21	36	-03
13	42	08	16	15	17	21	35	17	10		19	23	27	12	06	20	12	15	13	17	18	24	13	28	13	05	-13	-12	30	-13
12	26	10	23	04	18	-21	31	14	12	19		16	32	00	02	14	22	09	18	19	32	29	05	28	26	22	-04	-06	32	-18
15	15	14	26	13	19	-16	19	22	17	23	16		32	12	16	31	21	19	08	27	33	42	13	38	25	-03	-07	-08	43	-25
26	32	29	32	12	28	-07	22	22	25	27	32	32		13	19	28	25	17	25	34	39	36	11	34	34	08	08	-07	51	-25
08	11	19	12	03	02	03	04	11	17	12	00	12	13		12	20	10	22	11	18	19	16	09	14	26	-06	10	-14	17	-04
11	07	01	16	15	16	00	04	20	25	06	02	16	19	12		25	23	24	03	26	23	13	04	08	15	-17	03	-15	28	-09
17	27	17	38	06	16	-06	24	21	28	20	14	31	28	20	25		22	33	10	42	37	38	15	24	35	-15	03	-14	44	-08
14	16	15	25	04	22	-20	15	20	25	12	22	21	25	10	23	22		18	07	20	25	33	15	30	25	-06	01	01	33	-18
11	14	22	31	05	09	-10	14	22	19	15	09	19	17	22	24	33	18		00	21	30	32	05	20	22	-01	05	-16	30	-05
29	20	25	18	15	19	-14	19	14	22	13	16	08	23	11	05	10	07	00		20	13	21	13	16	16	-05	-06	12	22	-33
24	23	12	35	14	22	-02	31	14	31	17	19	27	34	18	26	42	20	21	20		39	47	10	33	47	06	00	-21	55	-18
24	26	34	32	14	26	-12	23	38	33	18	32	33	39	19	23	37	25	30	13	39		51	12	40	55	03	-08	-17	57	-17
29	26	18	37	15	29	-18	37	32	33	24	29	42	36	16	13	38	33	32	21	47	51		17	45	53	08	-05	-19	70	-25
10	11	03	18	10	20	01	13	20	13	11	05	13	11	09	04	15	15	05	13	10	13	17		10	12	-04	01	-09	13	-10
27	28	18	26	16	27	-05	26	24	29	28	28	38	34	14	08	24	30	20	16	33	40	45	10		41	-04	-07	-15	46	-16
23	31	16	40	16	22	-15	28	23	45	13	26	25	34	26	15	35	25	22	16	47	55	53	12	41		08	01	-20	54	-21
-04	09	-01	01	-15	03	-10	20	-08	-03	05	22	-03	08	-06	-17	-15	-06	-01	-05	06	03	39	-04	-04	08		-08	00	08	03
-09	-07	02	10	-10	04	04	-03	-02	04	-13	-04	-07	08	10	03	03	01	05	-06	00	-08	-05	03	-07	01	-08		-04	-03	-06
-07	-08	-04	-15	-08	-07	-14	-15	-01	-21	-12	-06	-08	-07	-14	-15	-14	01	-16	12	-21	-17	-19	-09	-15	-20	00	-04		-19	18
38	42	19	37	19	36	-03	35	37	36	30	32	43	51	17	28	44	33	30	23	55	57	70	13	46	54	08	-03	-19		-27

Unrotated Factor Matrix

Tests	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	h^2
1. Cartoon Analogies	37	36	-04	-05	02	18	-06	08	24	-01	04	16	09	08	11	08	11	02	05	45
2. Cartoon Exchange	59	-06	06	-03	03	04	14	00	02	-18	03	-14	15	-09	07	09	17	11	-20	56
3. Cartoon Implications	67	23	-03	-08	-06	-02	-12	06	00	-01	02	01	15	-08	-15	-06	03	-03	11	60
4. Cartoon Predictions	51	17	-05	-21	02	-05	08	13	-06	-09	-16	-11	-05	02	-04	16	-02	04	28	52
5. Consequences - obvious	14	02	-44	-16	13	15	-07	-21	04	08	-03	-18	-12	16	06	04	-04	-13	01	43
6. Consequences - remote	23	-27	-43	24	-17	-26	08	14	09	-15	06	17	06	-15	-09	01	09	-04	00	60
7. DAT Abstract Reasoning	67	-19	22	-26	-02	25	19	-12	38	-08	07	-07	06	-08	-06	-21	-01	-04	07	94
8. Expressions	57	25	-05	00	-11	-10	15	-12	-03	08	14	02	07	07	16	-04	02	-05	09	52
9. Expression Exchange	42	10	06	19	05	-08	-09	08	25	-06	-05	-08	-06	12	06	-06	-03	06	-12	37
10. Expression Grouping	58	38	-21	02	-14	-09	27	-03	-04	10	-07	20	04	05	-01	-16	-09	18	-06	76
11. Faces	23	28	-10	16	05	12	-01	-26	-22	-15	00	15	07	-03	02	00	-06	-11	03	37
12. Facial Situations	32	32	-11	-06	-10	21	11	-09	-19	06	-11	-15	-16	00	-16	03	22	-08	-13	49
13. Figure Matrix Test	44	-11	11	-19	25	-12	21	-04	-30	-06	-04	-03	11	16	01	-17	-06	-08	-03	55
14. Henmon-Nelson Vocabulary	75	-27	06	19	-01	03	-13	19	-06	23	00	-14	05	11	01	03	-03	-09	02	82
15. Hidden Figures	52	-24	09	-32	03	09	04	-03	01	-07	13	08	-11	07	-04	-03	-02	03	-09	51
16. Inflections	42	25	-07	-05	-16	03	-18	-08	-05	10	-06	08	-06	-08	12	01	-04	03	-04	36
17. ITED Quantitative Thinking	75	-35	04	-03	26	-06	06	-07	-12	-03	-07	09	05	-04	00	18	15	10	01	86
18. Missing Cartoons	71	24	08	-19	-08	-20	-11	-14	01	-04	13	-09	20	-19	-01	10	02	-12	09	82
19. Missing Pictures	50	31	-03	02	06	-07	-11	11	-19	-14	11	-11	-07	01	-15	09	-20	10	-13	56
20. Mutilated Words	34	-08	05	-32	-20	09	-14	17	-19	-02	04	15	-21	-06	11	-05	-02	08	-04	45
21. Odd Strip Out	65	24	06	-05	02	-06	-05	04	-04	-11	18	-16	03	-03	03	01	-07	-04	-05	58
22. Penetration of Camouflage	42	-15	-10	-27	00	-06	04	22	-07	14	16	17	02	07	02	00	12	-06	-05	44
23. Pertinent Questions	50	-19	-45	05	01	03	00	-08	08	-14	-10	-06	-04	-07	01	10	02	02	-08	56
24. Picture Arrangement	40	60	-04	-17	26	-48	-24	-07	24	15	-09	07	02	09	-03	-05	-01	-05	-10	67
25. Picture Exchange	60	09	08	05	06	-23	00	-03	-02	-14	-06	-04	-12	06	18	-05	08	20	13	58
26. Picture Exclusion	28	12	-06	-07	-19	26	19	18	18	06	-02	06	17	05	15	10	-10	-03	-11	40
27. Picture-Group Naming	42	-17	-13	00	-16	01	-08	22	-03	-17	-15	-05	07	-07	-15	-11	-15	-04	02	43
28. Plot Titles - low quality	-11	-09	-52	-14	52	10	07	16	-09	10	09	-03	07	-09	11	-09	-04	02	04	69
29. Plot Titles - high quality	44	-20	-33	20	-26	-13	08	-04	-03	-05	05	-03	-05	00	03	-08	-03	-04	-05	50
30. Questions II	45	08	-04	-05	16	17	-26	02	-01	01	-19	-04	12	-23	09	-07	06	-02	-14	48
31. Reflections	52	08	03	12	04	-12	23	09	08	04	-23	-11	-08	09	13	10	-10	-06	-08	50
32. Seeing Problems	36	-07	-52	14	-02	17	-12	-12	05	04	07	06	02	10	-04	03	-02	09	12	53
33. Seeing Trends I	39	-31	05	-08	-24	06	-08	-33	-07	-12	-10	08	-07	06	08	-01	02	-03	-05	49
34. Sentence Order	47	-05	13	16	00	15	-24	06	-01	01	10	01	08	14	-09	09	-02	22	00	45
35. Ship Destination Test	58	-22	03	-16	10	06	-08	-07	04	-14	-01	08	-05	16	-10	09	-02	05	06	52
36. Silhouette Relations	30	23	-01	01	18	01	15	-07	12	25	-01	07	-14	-06	-33	-01	09	05	-05	43
37. Social Relations	29	13	10	16	19	20	06	28	-01	-18	-15	22	-08	06	-02	08	03	-19	04	45
38. Social Translations	54	08	05	29	17	06	-06	-02	16	-13	26	-10	-27	-02	05	-09	02	-09	04	64
39. Sound Meaning	42	02	12	18	-02	-01	-05	-01	00	-12	-18	07	15	19	-09	-13	10	-10	00	38
40. Stick Figure Opposites	40	16	08	19	14	-03	-08	-08	-04	01	08	19	-07	-03	03	-07	10	-03	-02	33
41. Street Gestalt Completion	36	03	-10	-29	-29	-16	-05	13	07	09	-01	-02	-15	04	-06	07	05	-11	02	41
42. Verbal Analogies I	58	-11	11	12	05	02	16	14	-08	-01	21	00	-12	-04	-02	-02	-05	-05	01	50
43. Verbal Classification	65	-15	18	04	10	08	-14	-07	02	14	-13	20	-10	-20	04	01	-23	-05	00	70
44. Verbal Comprehension	70	-22	14	25	-12	03	-09	06	-17	31	06	-10	07	02	06	-01	13	-06	03	82
45. Who Said It?	24	03	-07	-03	-06	12	-09	14	00	02	-20	-14	-10	-06	04	-27	13	12	10	30
46. Word Classification	57	-11	01	04	-04	13	02	-12	-03	14	01	-04	18	11	-11	-03	-11	06	02	47
47. Word Matrix Test	65	-12	17	15	01	-02	29	-10	03	16	-09	-03	-08	-20	02	10	-06	06	08	69

Note. — Decimal points omitted.

Rotated Factor Matrix

	Tests	hfc[a]	CMU	CMC	CMR	CMS	CMI	DMU	DMT	NMU	NMS	CFU	CFR	NFT	CBU	CBC	CBR	CBS	CBT	CBI	Res.	h^2
1.	Cartoon Analogies	CBR	-01	00	-09	-05	19	-08	-13	-12	05	03	00	18	23	22	37	10	20	20	05	45
2.	Cartoon Exchange	CBT	11	04	13	29	07	-07	05	05	-05	-09	13	21	11	18	01	28	40	11	24	55
3.	Cartoon Implications	CBI	17	22	-07	06	09	-08	14	02	07	11	18	11	24	13	24	41	20	10	00	61
4.	Cartoon Predictions	CBI	02	05	06	20	09	04	-03	01	-05	18	09	05	07	07	10	26	16	55	-07	52
5.	Consequences - obvious	DMU	01	-09	-01	01	40	45	-10	08	10	09	09	-03	12	00	-01	09	-02	04	-01	44
6.	Consequences - remote	DMT	05	-02	06	07	24	-02	69	10	02	-02	-09	10	-04	05	02	-05	07	08	06	60
7.	DAT Abstract Reasoning	CFR	05	28	20	04	21	-14	-07	14	00	09	66	27	03	10	14	09	34	14	21	95
8.	Expressions	CBU	13	-04	22	00	12	-05	09	-12	09	08	19	09	36	27	08	26	17	20	-13	53
9.	Expression Exchange	CBT	09	07	07	-05	05	-04	01	09	27	-04	-01	00	02	16	16	10	43	11	03	37
10.	Expression Grouping	CBC	-08	16	17	04	06	06	22	-11	05	18	08	-02	27	59	19	27	16	18	-12	77
11.	Faces	CBU	-06	02	04	07	09	01	03	11	-09	-17	01	-11	40	09	19	22	-03	-02	-19	37
12.	Facial Situations	CBS	11	-11	07	09	09	13	-09	05	-20	23	05	-18	12	21	21	42	05	00	09	49
13.	Figure Matrix Test	CFR	11	03	13	33	-25	20	02	11	06	-07	37	16	09	15	-04	18	10	14	-17	55
14.	Henmon-Nelson Vocabulary	CMU	65	25	20	13	10	04	09	18	16	04	06	16	05	09	09	14	27	22	00	81
15.	Hidden Figures	NFT	04	16	16	26	09	02	-04	18	07	22	29	39	00	05	06	15	18	01	00	51
16.	Inflections	CBU	06	14	04	-02	09	-02	-02	05	09	24	-08	01	38	15	10	22	13	09	01	36
17.	ITED Quantitative Thinking	CMS	24	21	26	65	09	05	13	08	10	-02	16	23	14	01	11	11	26	19	08	87
18.	Missing Cartoons	CBS	10	10	08	09	08	-19	10	-03	19	07	25	16	41	-01	05	52	16	35	10	82
19.	Missing Pictures	CBS	-01	17	06	05	-02	07	02	09	10	00	-14	08	06	11	12	58	23	17	-15	56
20.	Mutilated Words	CFU	04	16	02	10	-06	-02	-03	17	-09	45	-03	14	14	02	00	11	13	03	-07	45
21.	Odd Strip Out	CBC	11	08	12	00	02	-02	02	04	10	00	12	19	22	08	10	50	34	23	-04	56
22.	Penetration of Camouflage	NFT	20	02	04	18	00	11	16	-04	07	25	11	45	05	12	10	09	02	10	01	44
23.	Pertinent Questions	CMI	04	07	11	22	41	23	28	22	04	02	-01	06	12	09	01	12	24	13	14	55
24.	Picture Arrangement	NMS	01	06	-03	16	-07	14	15	-03	67	11	14	06	12	-03	09	08	14	19	11	66
25.	Picture Exchange	CBI	04	03	15	25	00	-07	07	-02	15	11	08	00	22	09	05	13	51	27	-17	58
26.	Picture Exclusion	CBC	06	06	08	-15	16	-03	-09	04	-10	00	-01	26	08	41	09	03	03	18	18	40
27.	Picture-Group Naming	NMU	14	25	-07	03	06	02	27	35	-05	07	06	09	-04	10	-01	14	16	25	02	43
28.	Plot Titles - low quality	DMU	-08	06	-12	04	08	69	13	-24	-12	-16	-01	19	01	-12	01	-12	-05	03	-01	69
29.	Plot Titles - high quality	DMT	18	01	20	03	28	05	43	20	04	10	03	03	10	18	-10	11	19	04	-06	50
30.	Questions II	CBU	13	26	-13	10	-02	16	-03	13	01	01	02	05	34	01	15	17	26	10	27	48
31.	Reflections	CBI	13	-01	35	07	-03	09	01	13	15	-01	02	-04	06	28	10	10	27	36	08	50
32.	Seeing Problems	CMI	13	16	-04	08	57	21	20	03	04	02	-03	03	14	12	10	05	08	02	-13	54
33.	Seeing Trends I	NMU	10	07	15	28	20	-16	01	37	06	19	19	06	23	06	-13	01	09	-09	-01	49
34.	Sentence Order	NMS	29	30	-03	17	16	-16	-09	05	12	-04	-07	13	00	10	14	18	26	02	-11	45
35.	Ship Destination Test	CMS	08	18	08	37	21	-01	-03	23	17	10	21	24	01	03	13	13	19	16	-08	52
36.	Silhouette Relations	CBR	-01	16	17	09	03	10	03	-21	12	12	13	-15	-06	12	40	23	02	01	10	43
37.	Social Relations	CBR	07	00	07	09	-10	02	-05	22	-12	-12	-07	11	03	08	50	-01	13	22	-05	45
38.	Social Translations	CBT	14	04	28	-08	17	02	06	07	10	-07	11	07	10	-13	34	21	51	00	-14	64
39	Sound Meaning	CBC	23	03	-07	16	-02	-14	08	23	11	-09	18	-07	11	22	21	07	19	11	-06	38
40.	Stick Figure Opposites	CBR	10	07	13	10	-03	-04	08	-02	13	-02	03	02	27	03	34	13	22	-04	-10	34
41.	Street Gestalt Completion	CFU	09	-07	04	-02	10	-04	11	09	14	45	06	16	02	08	02	20	01	26	07	42
42.	Verbal Analogies I	CMR	24	15	37	09	-01	-01	15	07	-04	01	13	24	00	05	18	21	27	10	-11	50
43.	Verbal Classification	CMC	18	49	33	16	00	-01	00	24	18	09	09	12	29	-02	22	04	15	15	07	71
44.	Verbal Comprehension	CMU	71	21	24	16	05	-09	11	05	07	09	08	08	19	10	06	15	25	08	00	82
45.	Who Said It?	CBT	13	13	-15	-02	01	11	03	04	-14	25	09	-11	06	06	04	-01	32	11	03	30
46.	Word Classification	CMC	27	36	11	19	21	-02	00	04	08	-01	20	05	08	27	00	19	14	08	-05	49
47.	Word Matrix Test	CMR	20	28	55	22	06	-09	08	00	00	04	17	-04	12	12	09	10	23	24	11	69

Note. —Decimal points omitted.

[a] Hypothesized factor content.

Target Matrix for Rotated Factors

Tests	CMU	CMC	CMR	CM.	CMI	DMU	DMT	NMU	NMS	CFU	CFR	NFT	CUU	CBC	CBR	CPS	CBT	CBI	Res.
1.														.65					
2.																.90			
3.																		.70	
4.																		.80	
5.						.70													
6.							.70												
7.										.75									.05
8.												.65							
9.																.75			
10.													.70	.80					
11.																			
12.																.75			
13.										.75									
14.	.75																		
15.												.80							
16.													.75						
17.				.75															
18.																.80			
19.																.40			
20.										.75									
21.																.70			
22.												.80							
23.					.75														
24.								.60											
25.																	.80		
26.														.50					
27.									.75										
28.						.68													
29.							.72												
30.													.80						
31.																		.80	
32.					.75														
33.									.75										
34.										.60									
35.				.75															
36.															.83				
37.															.83				
38.																	.80		
39.														.75					
40.															.80				
41.										.75									
42.			.80																
43.		.85																	
44.	.85																		
45.																	.75		
46.		.80																	
47.			.85																